# A BILL TO PROVIDE FOR THE ESTABLISHMENT, UNDER THE NATIONAL SCIENCE FOUNDATION, OF A NATIONAL SCIENCE ACADEMY

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## HEARING

BEFORE

## SUBCOMMITTEE NO. 3

OF THE

## COMMITTEE ON SCIENCE AND ASTRONAUTICS

## U.S. HOUSE OF REPRESENTATIVES

EIGHTY-SIXTH CONGRESS

SECOND SESSION

ON

## H.R. 4986

DECEMBER 6, 1960

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# A BILL TO PROVIDE FOR THE ESTABLISHMENT, UNDER THE NATIONAL SCIENCE FOUNDATION, OF A NATIONAL SCIENCE ACADEMY

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TUESDAY, DECEMBER 6, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
SUBCOMMITTEE No. 3,
*Washington, D.C.*

The subcommittee met, pursuant to call, at 2 p.m., in room 214–B, New House Office Building, Hon. Victor L. Anfuso (subcommittee chairman) presiding.

Mr. ANFUSO. Gentlemen, the committee will please come to order.

This is a continuation of the hearings on H.R. 4986, a bill to establish a National Science Academy.

This is a rather informal meeting. I want to prepare the way for the formal hearings which will commence here in Washington soon after the new Congress convenes.

We are extremely honored to have present some of the foremost scientists in this field, who have come here voluntarily, at their own expense, because of their great interest in the subject and particularly in the Science Academy.

I want to take this occasion to particularly express my gratification to Mr. Pete Summers, who comes here all the way from California, again at his own expense and in the public interest, because he believes in the Science Academy. I might add for the record that he has been extremely helpful to me in the past in guiding the activities of this committee and in promoting its interests outside of this city, in California and other parts of the United States and outside of the United States.

I am also particularly grateful to Mr. Charles Luckman of Charles Luckman Associates, which in my opinion is one of the most important architectural and engineering firms of our great country. He, too, has been of great help to me in the formulation of the policies of this committee and particularly with respect to the Science Academy.

I am more than grateful—more than I can express in words—for the appearance here today of Dr. Wynder, who is a member of the Sloan-Kettering Institute and head of the epidemiological section. He is considered one of the top cancer research scientists of the world. He comes here because of his belief in the Science Academy and in

what the Science Academy can do in the field of medicine and cancer research.

We are also extremely honored to have Mr. Crosby Kelly, vice president of Litton Industries, one of the fastest-growing electronics companies in America, which has already absorbed some 20 other companies in the past few years. Mr. Kelly has some very interesting views which he would like to express before this committee.

We are honored also to have Mr. Ward Dennis, director of development planning of Northrop Aircraft Co. We are all familiar on this committee with the work of Northrop and the great part that it is playing in the field of science.

We are also honored to have both Mr. Frederick Durant and his charming wife. Mr. Durant is director of research and development of Avco, and he is considered to be a top systems man throughout the world. I am sure that his testimony is going to be enlightening to the committee.

I am, first, going to call upon Dr. Wynder. As I have stated before, he is the head of the epidemiological section of the Sloan-Kettering Foundation in New York, and is a top cancer research scientist.

Dr. Wynder, you have read, H.R. 4986 and some of the preliminary hearings, have you not?

Dr. WYNDER. Off the record.

(Discussion off the record.)

## STATEMENT OF DR. ERNEST L. WYNDER, HEAD OF THE EPIDEMIOLOGICAL SECTION OF THE SLOAN-KETTERING INSTITUTE, NEW YORK, N.Y.

Dr. WYNDER. As someone interested in biological sciences, I am interested, of course, in scientific progress and scientific advance throughout the world and particularly in our country.

I think the bill and the establishment of a Science Academy can contribute to improving scientific standards and knowledge in this country.

I would like to make sure, of course, that as the bill is written and finally carried through, it has the approval of the major universities of this country. As I understand, it has, because, certainly, you do not want to compete with the major universities. This would be unfortunate, but I think as I see the present outlines, the bill would aid rather than compete with existing universities.

Without going into details—that is, whether it should cover only undergraduate studies, postgraduate studies, or both—as I see the advantages of this Academy, they fall into the following categories:

For one, I think it can set a standard for scientific education to be set as a guideline for all other universities. As part of the standard there would be, I think, a more compulsory system of education which, of course, is not so necessary for the postgraduate level, because it is understood there, but I think it is very important at the undergraduate level, and it may filter down even lower into the elementary school system.

I think one of the functions of this Academy would be to set forth an educational system or to set an example for an educational system to be followed by all American schools. I think that one of the handicaps of the American system of education as I see it now, in contrast to many of the European systems, is that we give too much freedom to our students at a time when they cannot choose courses wisely. For instance, I was brought up in Germany, where I went to a humanistic gymnasium and had Latin when I was 10 years old and Greek when I was 13 years old; and I can assure you, if I had had my choice, I would have taken neither Latin nor Greek. I had mathematics when I was 14 and physics when I was 14, and, in retrospect, if I had had my choice, I would not have taken those subjects.

I think we must make education in these earlier years compulsory, and I think this would be one of the functions of the Science Academy—to set a guideline for our educational system. I think we fail to place enough stress on the earlier years of education.

I believe it was Martin Luther who said, "If you give me your child when he is five, then he is mine for life." This may be somewhat exaggerated, but I think there is a great deal of truth in it. The minds of our children can be greatly influenced and formed at a very early age.

In addition to setting a standard, I think another advantage of the Academy is that it gives prestige and motivation to people who want to go into science and those who are presently scientists. I think motivation and prestige are very important factors, which decide whether or not people will go into a given field. For instance, in the pre-Hitler era, and perhaps even today, German scientists were the ones most known throughout the world. They were so not because the Germans have inherited a trait to be scientists, but because there was a great deal of prestige and tradition in Germany for the best families to send at least one of their sons into science. This, as you well know, is not true of this country. Our best families are more inclined to send their son to business school or to law and not so much into the sciences.

Germany, as you know, had also instituted the Kaiser Wilhelm Institutes, now called the Max Planck Institutes, which I think are on a par with the National Academy of Sciences, because they helped very much in increasing the prestige of German scientists, and many of the great discoveries in Germany were made within the confines of the Max Planck Institutes or, as they were formerly called, the Kaiser Wilhelm Institutes.

I think this can serve as an example here in terms of motivation and prestige and opportunity.

An example that I noticed on the recent trip around the world was, for instance, in Australia. We have been concerned for some time that the Australians have such a great number of tennis players who tend to defeat us in the Davis Cup games. The reason, of course, is that tennis has a high prestige and traditional level in Australia; that it is almost a compulsory sport in all the high schools. In addition, they have the opportunity to practice because they have not only many tennis courts, but I noticed when flying to Sydney or Melbourne at night one can see many lit areas and these are the tennis courts. So, you have the combination of opportunity and

prestige and tradition for many Australians to become great tennis players.

Another example along the same line is the predominance of Russians in chess. This is not because the Russians are born to be greater chess players than we are, but because chess is a very popular game in Russia. You can go through the park and see youngsters playing chess. So, the more opportunity we give people, the greater the prestige and the tradition of any given field, be it sports or science, the more people we will develop who will excel in these fields. In other words, the greater the pool, the greater chance there is to find people who will contribute. So, anything that we can do to increase the tradition, the prestige, and the opportunity of a given field—in this case science—we must do so, and it seems to me that it is in this field that the Academy of Sciences that you have recommended can make one of its greatest contributions.

I am very much concerned, particularly in the field of biological sciences, with the few qualified men that enter the field at the moment. I am often asked, "When will you solve the cancer problem?" And, "What do you need? Do you need more money?" My feeling is that this country is contributing a great deal of money to cancer research. What we need above all is the qualified people, the devoted people, that will enter the field. At the moment we are in the position where many of our scientists who work with us in the cancer field come from Europe. I do not see any need for this if we would educate enough of these people in our own country. The majority of our medical students do not want to go into basic research. They will probably go into medical practice, and I think the major reason is that basic research has not the tradition and does not have the prestige, and above all, of course, does not have the income that medical practice gives.

I have another idea, in which the retired executive vice president of the Bank of America and I were interested, which I would like to introduce for your consideration. It is a different approach to the fellowship program, and I think would also aid in improving the number and the quality of the young men who enter science. There are today probably around 30,000 fellowships which are available to people in various scientific endeavors. Many of these fellowships go unwanted because they pay relatively low stipends and most of them carry no prestige. It is our contention that if we would establish a fellowship program which would pay an adequate salary and they would have a name that would give the scientist a prestige value, we would then get many more youngsters to practice science. After all, we have this program in baseball where we select the most valuable players. The movie industry has its Oscars, and the only ones they honor are top people and not the scientists. In other words, we must have a coordinated program in order to improve the standard of American science in the eyes of the young people.

Mr. ANFUSO. Can I interrupt you for a minute?

Dr. WYNDER. Yes, sir.

Mr. ANFUSO. I introduced a bill, which became law, to give a Presidential award—Presidential recognition—to any scientist who makes a breakthrough.

Would you add to that, in addition to the honor bestowed upon him by the President of the United States, a cash stipend?

Dr. WYNDER. I would say this: The kind of feat that you demand, would also probably win the Nobel Prize and, so the scientist would be amply rewarded. I am thinking in somewhat lower terms. I am thinking about the training program. We do not necessarily want this man to solve the cancer problem or the heart disease problem in order to get this fellowship. We want to see this go to the undergraduate and postgraduate who is interested in science, and this ought to be of such a privilege that it would compete with a fellowship from Litton Industries or from Northrop, who now have a much better appeal, because of a higher salary and better advancement than the basic research institute.

Our suggestion would be to establish, let us say, a "Benjamin Franklin" fellowship and scholarship. We might give it a price ranging from $8,000 to $20,000 a year, and make this fellowship so well-known that it would be equal to the prestige, let us say, of the Rhodes Scholar, in order that a youngster would say, "I would be very proud to be a Benjamin Franklin Scholar," and he would thus be recognized by our society because, after all, the primary motivation in life of the average citizen is to be respected by his fellow man.

At one of your earlier hearings someone referred to Thomas Edison and said that Mr. Edison succeeded in spite of his handicaps. This is true of Mr. Edison and other true geniuses, but, unfortunately, there are not many true geniuses in our country or any other country. So, we must encourage the young man in any way which we can. I think this fellowship program is one idea, and certainly, I think the National Science Academy is a major idea in this field, and it would seem to me that in this direction lies its greatest advantage. In other words, to elevate the scientist, be it the scientist in the physical sciences or in the biological sciences, which we must not neglect, after all, because I think recently we have found, perhaps, too much emphasis on the physical sciences and have somewhat neglected the biological sciences. I think they are all important.

I think the major emphasis must be to motivate, add prestige, and to set up the standards by which scientists are developed and furthered, and I think in this entire program, then, we can add to the progress of American scientists. I think in this light your idea has great merit.

Mr. ANFUSO. Thank you very much, Dr. Wynder. We will come back later, if we may, to ask a question or two of you, but for the time being, in order to make sure that we get all of these witnesses in, since they have come from all parts of the United States, I will not interrupt by asking any questions, but will now call upon Mr. Crosby Kelly.

Mr. Kelly, would you mind giving us your views on this subject?

## STATEMENT OF CROSBY M. KELLY, VICE PRESIDENT AND ASSISTANT TO THE PRESIDENT, LITTON INDUSTRIES, INC., BEVERLY HILLS, CALIF.

Mr. KELLY. First, Congressman Anfuso, I would like to express the appreciation of my company and of myself for the opportunity to ap-

pear before this subcommittee today, which we consider to be an opportunity both because it enables us to pay tribute to the wisdom of this bill and also to express our feelings in support of the bill.

I think you and your colleagues ought to be commended for having inserted in the agenda of the 86th Congress H.R. 4986.

I would like also to comment that my remarks may be directed a little bit more to the orientation that I have, and my company has, in the physical sciences than were Dr. Wynder's remarks, and I hasten to point out that this in no way implies any contradiction of what he has said. Rather, I trust that it, I might say to you and your committee today, could be considered a complementation of what Dr. Wynder in his wisdom has set forth today.

Next, I would like to comment that my remarks are based on two predications: First, if you will excuse the indulgence, I would like to say that my remarks stem from my own company which is now a company with 18,500 employees, operating in 25 research and/or manufacturing laboratories or plants in the United States and some 12 such operations in foreign countries, and a company in whose personnel complement we find somewhere between 3,000 and 3,500 graduate and practicing scientists and engineers or highly skilled, qualified, experienced, and trained technicians.

Secondly, another predication is that our company believes that the present state of world conflict is an active conflict in three broad areas.

One is the area of the threat to our national defense and the threat to the defense of the free world countries with whom we feel so close. Secondly, this conflict is an active conflict in the area of economics. Thirdly, this state of conflict is an active conflict in the field or area of ideology.

With these two predications in mind I would like to reflect the considered opinion that the establishment of a National Academy of Science could make a very real, a very worthwhile, immediate, and enduring contribution to the solution of this state of conflict. Reviewing the three areas of conflict, it takes but a few words to point out that certainly the physical sciences will be the major contributor on a continuation of the stalemate that exists as far as our defense activities are concerned. We are most sincerely and devoutly hopeful that such a stalemate can exist indefinitely until it is solved in the form of complete peace.

Secondly, but possibly not quite so obvious, we feel that the continued building of a position of strength in the area of economic conflict will depend in great part upon our prowess, our leadership, and our capability in the technologies and the sciences. We certainly hope as American citizens that we will not have to ask our people nor the people of our fellow countries of the free world to compete economically in the world markets on the basis of subminimal wages or of low costs as they reflect the physical effort of human beings.

We would rather like to hope that we may continue to compete the world over in an economic way by virtue of our superior capability in technology and being able to produce more, better, and of better quality and with greater ingenuity—not solely by dint of human effort but more importantly by the ingenuity of our technological capability.

Thirdly, in that area of conflict which I have labeled with the words, "the conflict of ideology," we feel that the greatest proof of the wisdom of our point of view must be reflected in our deeds. Certainly we could hardly claim for ourselves a superior ideology if in this current world of technological advancement we were to be a second-rate nation. It would be a mockery to claim that our ideology is an ideology of leadership and progress and not have our technology keep pace. Among the problems that confront us as a nation today in bringing technology and the sciences to bear on these areas of conflict is the problem of our supply of people adequately trained, or more than adequately trained, and this supply from both a quantitative and a qualitative point of view.

In maintaining the defense posture of the country there is the first requirement that those branches of the Government concerned with this posture conceive the missions and the objectives as they understand them, and set these missions and objectives forth in their requests for support from industry and the scientists.

Their ability to see and envision and conceive such objectives and missions and the plans for solving them or meeting them, that ability is a direct representation of their collective intellect, skill and training. We cannot possibly have too much from a quantitative and qualitative standpoint. The progress we have made has been a great tribute to the devotion of the people in Government service as they have attempted to fulfill their obligations in this regard. I am sure that they would welcome the help that would be provided them by the addition of the graduates of both the undergraduate and postgraduate schools of a National Science Academy.

Next in sequence, once the missions and objectives have been conceived it is the obligation of industry to employ every possible ounce of its collective ingenuity in, first, on a wonderful American competitive basis, presenting their proposals for meeting these objectives to the Government.

Then, secondly, in executing the programs that have been assigned to them, once again industry, the scientists, engineers and technicians that are employed by industry could not help but welcome in our national interest the addition of more to their numbers and more opportunity for increase in their quality; the same opportunities that are provided by the proposed establishment of the National Science Academy.

We in Litton Industries and upon occasions too numerous to mention have regretted that there were just not enough hours in the day, not enough people working with us to offer greater ingenuity in greater quantity to the execution of the missions and objectives conceived by the people in the various branches of the Government.

Relative to that area of conflict that I have described as an economic area of conflict, I can only say that our contribution to the free world is today regretfully limited.

Much of our talent of an engineering and scientific sort is dedicated to our own self-interested purpose of our own defense. Too little in quantity and quality is applied to those endeavors that would manifest themselves in a more effective competitive position for free world countries in the economic field. We must consider as among our ex-

portable products our ingenuity in developing, conceiving, and producing new things for new markets that will provide new service and new wealth to the economic storehouse of humanity.

In the area of conflict I have defined as the area of ideology, I am sure with our modern techniques of communication all of us are aware of it as an area strongly influenced by the news value of what fills our channels of communication. Some of our esteemed leaders in this country have questioned the military and economic value in an immediate sense of some of our scientific endeavors, but I do not think these wise men have questioned or denied the prestige value on the world scene of scientific progress. Would that every "first," for example, in the field of outer space could be ours for years to come.

H.R. 4986 in our estimation provides a very measurable increment of progress in meeting the needs set forth in my description of these problems. I am sure from what I have read that it is the intention of the author of this bill to view it as a complementation of our present university-level educational system and to view it as being in no way exclusive or derogatorily competitive with our present system of university-level education.

There are for me three facts proposed in this bill of great significance. One is the establishment of the Academy itself with the opportunity it would provide to selected students to study in the fields of the sciences without personal economic sacrifice beyond their ability to endure. In this same respect this could not help but augment in quantity and quality our supply of scientific talent in this Nation.

At this point, I wish to insert once again my concurrence with Dr. Wynder concerning the opportunity of such an Academy to set higher standards for education at even lower levels and the opportunity that the establishment of the Academy would provide for increasing the prestige of people engaged in the sciences.

In a second aspect this bill proposes a very important contribution. It proposes to establish the Scientific Career Service. We in industry have regretted that there have occurred occasions when we in the environment in which we live and do not necessarily control—certainly no one company controls it—we have attracted people out of Government service, people engaged in scientific work. They are needed there, but the environment which they see in industry has perforce been a more lucrative and financially rewarding one and against our own will we have been guilty of what one might call a form of proselyting. It occurs to us that by the establishment of the Scientific Career Service there could well be the opportunity for service in the Government with the added prestige it would have to match its rewards not necessarily only financially but its total rewards, the rewards that anyone could find in industry. We feel that that aspect of the bill has great merit.

Thirdly, the bill clearly sets forth the opportunity for us as a nation to cooperate and help in a most meaningful way with the scientific and technological progress of our fellow, free-world nations. The fact that your bill specifically sets forth an opportunity for people from foreign countries to participate in this program is a fact that manifests the wisdom and vision of the author of the bill.

It has been my privilege both to live in certain foreign countries and to have visited others, and I have been singularly impressed in those countries that have dedicated themselves to participating in the progress of free world nations by their hopeful attitude that they, too, could become creators in the areas of sciences and technology. Whatever technological innovations have come from countries friendly to us over recent years, we must remember, have come without benefit of the research funds that our Government has dedicated to advancement of our defense posture and which funds they have turned over to American industry.

With the additional help to these countries that participation of their representatives as students could provide, we feel that this would be a boon to the relationship of our country with those friendly nations.

Lastly, I would like to say that the passage of this bill would be a great expression and declaration by this country of its determination and dedication to continue to provide leadership to the free world in the fields of the sciences and technology.

In conclusion, Congressman Anfuso, I would like as a citizen and as a representative of my company, to compliment you and your colleagues on the formation and the presentation of this bill.

Mr. ANFUSO. Thank you very much, Mr. Kelly.

Now we would like to hear from Mr. Ward Dennis of the Northrop Aircraft Co.

Mr. Dennis.

## STATEMENT OF WARD B. DENNIS, DIRECTOR OF CORPORATE DEVELOPMENT PLANNING, NORTHROP CORP., BEVERLY HILLS, CALIF.

Mr. DENNIS. First, I would like to thank you on behalf of myself and on the company's behalf for the privilege of appearing here and giving our comments on this proposed bill, H.R. 4986.

In general, I would agree with the statements that were made by the previous two speakers. I believe that the overall importance of our technical and scientific posture has been fairly well covered by them. As I am not aware of the total program in the United States to upgrade the posture of our scientific personnel and give them added stature and allow us to be more competitive in the race that we are in, I would like to limit my remarks to a few points on this specific, proposed bill.

It will put these in the form of questions which I feel would be of value to explore. I am unable to find fully the answers to the questions in the bill, and I am sure that testimony will probably bring the answers to these questions out subsequently. I have three questions.

The first question I would ask is this: The magnitude of the activity associated with this National Science Academy. Perhaps this can be measured in terms of numbers of students graduated per year, either undergraduate or in graduate work, and how this compares with the total graduate and undergraduate programs, let us say, for like students in the United States to get some measure of the contribution that it can make to the total pool. Maybe subsequent to that, how big would this program have to be in order to accomplish an objective of

increasing the posture of our scientific community, at least in quantity, to make it of benefit and make it worth while?

The second question: What incentives would be held forth to prospective students to attend such an institution?

I am thinking here of an individual who graduates from high school. He has a flair for mathematics and science. He is interested in pursuing his field of technology further, and he has the choice of going to existing academic institutions, but here is an opportunity to go to a national organization. As I understand this bill, he will have the privilege of going here under the same arrangements or similar arrangements presently in existence at the military academies which will assist him in financially going through this school.

I would be interested in seeing, for example, how this number of enrollees per year in this Academy would compare with the number of opportunities for fellowships that already exist.

Dr. Wynder spoke of something like——

Mr. ANFUSO. 30,000.

Mr. DENNIS. 30,000.

Dr. WYNDER. That depends on the time range of the program.

Mr. DENNIS. That includes others in science?

Dr. WYNDER. And related subjects.

Mr. DENNIS. In both undergraduate and graduate levels in related subjects?

Dr. WYNDER. Yes.

Mr. DENNIS. Then I would ask the question of magnitude of this effort in contrast with other fellowships and others going to other institutions.

The third question I would ask is: The use to which these graduates will be put subsequent to the completion of their education in the National Science Academy.

Here I have read in your bill that they must agree to serve a certain period of time subsequent to their graduation with the U.S. Government or perhaps in organizations designated by the U.S. Government. I believe this ought to be very carefully considered, as they certainly have an obligation if the Government provides them funds for their education. I think it is necessary to have such a restriction. Unless some other work is done along this line, however, I am not sure that this is an adequate incentive to these people. Again, I have not enough background information to be affirmative on this, but if a young man has an opportunity to get a technical education and is committed to work in a Government research laboratory, and if the rewards for his work in the Government research laboratories are not comparable to what he could get in an industrial research laboratory doing some other kinds of work, I am just wondering if the competition for these people will start not at the time they graduate but at the time they make the decision to enter the institution. For example, our high school counselors have pamphlets prepared by many organizations showing different salary structures. When a young man graduates and he has a choice of going into law, dentistry, science of certain kinds, he can find out how much he would expect to make after 5 years and how much he could expect to make after 10 years. One of the attractions of the medical profession is the amount that you can expect to make after a certain period of time.

Unless adequate thought is placed on the use to which these people will be put subsequent to their graduation, it may be that the competition for these people will be started at the time they are making the decision as to which academic institution initially to enroll in.

Certainly, private industrial companies provide educational grants to students. We do. I am sure that the majority of the major industries in the United States do. We have no strings attached to our grants. The graduate student completes his education under our scholarship and he can go to work for one of our major competitors the next day. He may desire this privilege and freedom, and may make the decision at the time he initiates and makes the decision as to which way he is going to go.

So, I would like to see these questions fully explored in future testimony prior to the completion and finalization of the detailed wording of this bill.

Thank you.

Mr. ANFUSO. Thank you very much, Mr. Dennis.

In answer to your last question our bill, at least as amended, will make provision for higher grades and salaries to make the work with the Government attractive enough. That is one of the things that we will consider very carefully.

Of course, as other witnesses have pointed out, there prestige is also involved in having a science corps connected with the Government, just like the prestige of the U.S. Navy, Army, and Air Corps. As I hear the testimony, I am more and more impressed with the idea of a Science Academy creating this kind of esprit de corps, so to speak, which will elevate the status not only of the boys and girls who take advantage of it, but all scientists. It will give them a new standing in the community which they are entitled to have. I do not believe that scientists today have the standing that they should have. They certainly do not have the standing they have in other countries, like Russia and Germany.

Mr. DENNIS. I certainly agree with that.

Mr. ANFUSO. Mr. Durant, may we now have your views?

The fact that we have left you for the last does not mean that you are the least important. We recognize the great contribution you have made in this field.

## STATEMENT OF FREDERICK C. DURANT III, AVCO

Mr. DURANT. Thank you very much, Congressman Anfuso.

I feel very honored and privileged to be here today representing the Avco Corp. and have the opportunity to comment on many of the extremely interesting facets of the bill which you have proposed and which I understand you are considering making certain revisions in and resubmitting to the upcoming Congress.

As I have sat here and listened to the extremely interesting viewpoints of the other witnesses today and the testimony they have given, it is extremely interesting to see certain similar elements coming from the differing backgrounds of each of the three preceding speakers and yet a very common agreement among them on the importance of certain elements surrounding this bill. Certainly, the importance of increasing the stature of scientists and engineers as a profession, and as you

have just finished commenting upon, the prestige that should be accorded someone who has dedicated his academic life and who is dedicating his future work on this both in the science and engineering professions should not be lost sight of.

We have to combat a concept of the egghead and the bushy-haired altruistic, politically naive trained scientist which picture has been fostered by certain writings and techniques in this country. All of us know and have the greatest admiration for many scientists and engineers in high positions, but this does not communicate itself to the high school students. It is something that in the communications field must be accomplished in the next few years. This is a part of the problem. As we have acknowledged, the Europeans do have this reverence for a man who has a Ph.D. and a particular professor. In the U.S.S.R. there is a similar recognition, but in a different manner—the state automatically provides perquisites and emoluments to someone who has this background—but it is in the same way as in Western Europe, a recognition. In this country the recognition is not accorded as yet.

I felt that Dr. Wynder particularly, in a very fine manner stated the three characteristics of opportunity, prestige, and position which we need for the scientist. Opportunity is the easiest that can be provided. Prestige takes some time and is simply a matter of time. But as to tradition, I think rather obviously it takes even more time.

What you have indicated you are going to spark is something I am very hopeful the next 10 years we will have, a tradition, and the National Science Academy can play a very important role in this. It seems appropriate that the United States having given recognition to the necessity for Army, Navy, and Air Force Academies to provide young men with specialized training, has recognized value to the future economy and common defense of this country. It seems appropriate that a Science Academy of some sort should be established. But, as Mr. Dennis has pointed out, and I am in somewhat the same position as he is today in that I have more questions than I have answers, perhaps this is healthy in view of the fact that you are anxious to obtain ideas. Questions may be the best way to put them forward.

I feel we should have someone here today speaking for the academic profession. Maybe you have other hearings set up and you are already in contact with a number of academic institutions, a half a dozen or 10 perhaps of the best known——

Mr. ANFUSO. May I interrupt to say that we did have one hearing confined solely to the academic professions.

Mr. DURANT. I would like the opportunity to review the minutes of that sometime.

Mr. ANFUSO. Yes, you may; and we found unanimity among those professors.

As a matter of fact, some of them were reluctant at first because they thought that this would take away from the scholarship idea, but when we said that the bill is going to be amended to provide for postgraduate courses which would permit the universities to grant fellowships for this very Academy, I think that they all felt mighty happy to cooperate.

This will in no way, as Mr. Kelly said, take away from the universities; if anything, it would help the universities. We are just cooperating in an effort to bring about more scientists and raise the prestige of all scientists, whether they go to academic schools or whether they enter this university. That is the general principle, to give a boost to science.

Mr. DURANT. Certainly, the academicians today would agree that we need many more than can be provided with current institutions or even with the plans for enlarging their own organizations.

Mr. ANFUSO. You said that you read the speech I am going to make tomorrow?

Mr. DURANT. I have it right here.

Mr. ANFUSO. You have the figures there, how far behind we really are.

Mr. DURANT. Correct. Not only with regard to high school graduates interested in entering the scientific and technological professions, but also the figures on the number of engineers and scientists we have today compared with the U.S.S.R. and the rate of increase of these in both countries. Certainly, the views of the major institutions must be obtained, and they must be educated to understand the purposes and the advantages of this bill, and the roles that the major scientific and technical institutes would play vis-a-vis a National Science Academy are important. We could expect that professors for the initial Academy would come from existing institutions primarily. Where else would they come from?

On the organization of the Academy, that is, the number and kinds of departments, certainly it would be hoped that they would be as broad as possible in oceanography and many of those sciences which to date have been neglected. I would certainly hope so. Many of those elements that come under the inclusive term of "astronautics," whether astrodynamic or astronomy. Certainly, I presume your thinking is that this would be a very broad coverage.

In addition to the basic sciences, physics and mathematics and the life sciences, indeed, they also would be included.

The graduate study aspect is not completely clear to me, whether this would be a portion of the initial bill or subsequently established. I was trying to think of both ways of looking at it and whether it would help attract some of the best teachers, young professors, and if they were able also to continue to supervise graduate students in their work. For this reason it might be desirable to have graduate studies even at the inception. Some thought would have to be given to this with respect to the total magnitude.

As Mr. Dennis queried, the numbers of personnel involved, whether in the order of 800 or 2,000 initially, or building up over a period of years, the numbers involved I still do not know. Some thinking should be given to this.

As Mr. Kelly applauded—and I certainly in particular occur with the desirability for international participation—from my own background, I have had the privilege of meeting and talking with scientific and technical people from foreign countries, and a part of each of the last 10 years have been engaged in international meetings. I note that there is a figure in the original bill of 75 persons, and yet the total number of people in the institution is not given.

That does not equate in my eyes. I feel that something in the order of 25 percent would not be wrong, and even in——

Mr. ANFUSO. Twenty-five percent?

Mr. DURANT. Yes. Even an international aspect of the Academy would not be incorrect. I think it should be considered. I know your own feelings, since we discussed this earlier today, even on the international students, where this might be established through NATO.

Mr. ANFUSO. How does the figure of 10 percent strike you? Suppose we envision an Academy with 3,000 students and 300 of those would be foreign students. How does that strike you?

Mr. DURANT. I just feel that, as prescribed by law, it is very difficult to agree upon the percentage in advance. I feel it should perhaps be a little more flexible.

Mr. ANFUSO. You mean you have no percentage or no number set for foreign students?

Mr. DURANT. I said 25 percent. I thought 1 and 4. This is again an intuitive reaction.

I have gained a great deal through association with foreign people and I feel that one of the things that this country has to combat is this concept that we have a corner on the "brains market," and we can in our own wisdom devise all the new scientific experiments within our own country. I feel there is certainly an opportunity which must be given to our own people, but I feel this country would be derelict——

Mr. ANFUSO. You may be changing my own views on this subject, but I think you are trying to establish a ceiling? It could be less.

Mr. DURANT. That is exactly right. There is no reason for it to be anywhere near the ceiling. I think it has to be proved, but it might be more difficult to amend the act later. That is all.

I think it should start out in a small manner, and very highly selective, and prove itself as it goes along. I feel that one of the most exciting and interesting things we can do is to get new concepts, ideas, and theories. It would be foolish in the extreme to think we can get all of those in this country.

The U.S.S.R. has not yet taken the initiative to allow an influx of these ideas into their programs. I feel that we still have an opportunity in this country to permit a much larger flow or influx into our own scientific and technical programs. I am thinking primarily of space age experiments and the opportunity to participate in NASA or other space programs in this country.

The channels simply do not exist other than in a very narrow sense. I think the ideas and the contributions that can be made by foreign engineers and scientists, particularly the younger ones—some channel should be provided. In a much broader sense I think this exists in all the sciences. It seems to me that it is terribly important to communicate the purpose and the concepts of this bill to a much wider audience. It would seem to me that the scientific and technical press channels must be informed, and in the best manner, because the first reaction is one of competition with our existing academic institutions.

Mr. ANFUSO. That is a very good point.

Mr. DURANT. We will need the statements of a half dozen of the major scientific and technical institutions supporting this concept and why they feel it is important, that their own organizations could not begin to meet the need and, at the same time, expressions of opinion of those who head up Government research and development labora-

tories, pointing out the advantage to the Government of having civil servants who are adequately trained and members of a career service.

One thing that occurred to me in listening to the testimony here with regard to international developments would be that the graduates of a science academy might fill a very important role through the State Department's offices abroad, through an expanded science attaché program, which to me is minuscule. This is a personal opinion.

I feel we should have science departments, science and technology departments, and attachés abroad of a much expanded nature. I think it would be only appropriate that there would be a significant number in key cities in the world. This is something I have never quite understood personally, why it has never been expanded in the manner that I feel would be necessary for communication, a two-way street with other countries, so that this country could be represented abroad in the science and technical fields.

Mr. ANFUSO. May I comment on that. It is my recollection—and Mr. Beresford bears me out—it is my recollection we do not have science attachés at more than nine posts throughout the world.

Mr. DURANT. I am speaking only from memory. Back about 10 years ago we established science attachés, and I think we had five initially authorized—Stockholm, Bonn, and a few others.

Mr. ANFUSO. One in Italy.

Mr. DURANT. Three or four were staffed, and then in the next 5 years they were withdrawn. There was never any indication that these were important individuals, that they should be backed up with appropriate staffs and be used as a channel of communications to, I feel, the important scientific and technical people abroad so that people in other countries would know where they could have a contact and a channel of communication if they wanted technical papers, if for nothing else. If they are interested in a particular subject, interested in a certain field, they would go to the science attaché or science and engineering attaché. Being an engineer, I feel the term "scientist" is one of the most difficult terms to define today because it very often includes the engineering profession. So perhaps we need a different term. I feel this is important to establish. Again, this is the international aspect.

Beyond the numbers of people concerned in this, I note that three locations in the country would be chosen. One would be picked for the actual permanent location of the Science Academy. There are many possible locations. It would not seem to make too much difference where it was located, to me, as long as it was attractive and there was opportunity for consort with intellectually stimulating atmosphere of other scientists and engineers. I do not think this could be laid in a wasteland. I feel most scientists and engineers in my experience lack the opportunity to consort with others on the fringes of their profession.

A final query would be the relationship of the graduates of the Science Academy to those individuals who are career service employees in the Government and who are in research and development activities in our military and other Government laboratories. The query is: One, whether they would be set apart or whether they would be given similar civil service ratings. Mr. Kelly invited my attention to this last portion under section 13(b) of the original bill, which is quite

interesting. Anyone who is an officer or employee of the United States and who performs duties and responsibilities similar to the purview of the scientific career service shall be eligible to be placed in such scientific career service.

This may or may not be the way. I do not know. It is a very interesting thought, but I think the administration of this would be not an easy matter since many thousands of individuals currently would be eligible for this. The processing of this would be difficult. Yet it might be the way. I am not prepared to comment. I think more thought should be given to it beyond what appears here.

Somewhat apart, I would like to comment upon your query with regard to a cash award with regard to a science medal. I personally feel it is highly desirable. I think it is great to get an award, but I think something of the sort—was the amount proposed $10,000—I think it is highly appropriate because an individual who contributed a new technique or concept of importance, such as to be recognized by the Government, could use something of this sort. He could use it to further this concept himself, either in a capitalistic manner or to retire for further study, pay his own sabbatical for a year. I think this would be highly desirable. It would seem to me to be well worth the relatively small amount of money involved.

A few of my comments have been rather rambling, but I have been thinking somewhat off the top of my head. I hope I will have the opportunity to review some of the previous testimony and to perhaps thereafter comment further later. Thank you.

Mr. ANFUSO. Thank you, gentlemen. Each and every one of you has been extremely interesting. You have made a tremendous contribution to this study. We have had formal hearings here before, and have had an awful lot of questions asked. I think that while the questions today have been few, the thoughts expressed by each one of you have been very provocative.

I might add by way of concluding these hearings that my recent trip to Russia, Germany, Japan, and most recently to NATO, attending as a member of the NATO Parliamentary Conference, convinces me that we must have a Science Academy in the United States. As you all know, Russia has set up a "Friendship University." They are inviting students to it from all over the world, including the underdeveloped countries. They are trying to attract these students by giving them free board and even giving them a small stipend while they attend this university. Surely, the free world can establish a university in the nature of this academy which is comparable and, I would hope, superior.

The advantage of having this great university or academy in the United States is that here no one has to sacrifice his or her freedom. These students can come from all over the world. We make no demands upon them. They will go back, and we hope they will help to improve conditions in their own countries and to strengthen the free world.

A further advantage of a large Science Academy is something which made Dr. Glennan think twice about it and become inclined more favorably toward it than he had been previously. That is the fact that this Science Academy will have probably the largest research center in the whole world, which will not only serve as an academic school but also will permit scientists and graduate students to carry

on. It will be the best equipped, certainly will have the best equipped laboratories. As I say, it will be most attractive to students all over the world.

I am inclined to agree that the number of foreign students should be increased, and certainly the new bill which I will introduce will make changes in that regard, especially in view of the Friendship University proposed by the U.S.S.R. I would like to get a lot of these students who otherwise would go to Russia to come to the United States. In that way we can promote better ties between our respective countries. It will increase the prestige which all of you have spoken about. I think it will enhance our position throughout the world. It will help us to make more allies than we have, and to keep those that have not changed thus far.

One of the most provoking things I have noticed—I have been a delegate to the U.N.—is the number of undecided countries, this neutralist bloc. I frankly think that in this world of ours there should be very little room for neutralism. This will require convincing. It is a question of proving our case. As a lawyer would say, are we right? That will require not only salesmanship but facts. So I am hoping that the Science Academy will have a great deal to do with promoting good will throughout the world and perhaps finally bringing about a greater understanding between the United States and the U.S.S.R.

I was very much impressed with the scientists from Russia. I talked to their top scientists. I believe that, by and large, scientists, regardless of the country from which they come, would like to promote the peace of the world. Maybe it is the politicians who go astray. Maybe it is their love for power. Scientists as professional people are, by and large, I think, great humanitarians. I believe that a combination of scientists and statesmen—we need good statesman too—will go a long way in achieving the kind of Academy that will make all of us proud. I certainy want to thank each and every one of you for taking this time out. I believe you have done a great service to your respective concerns, and you certainly have done a great service, I think, to the United States. Thank you very much.

Dr. WYNDER. Some of the scientists who come from this Academy can be used for many jobs right within the Government where today scientists are needed. For instance, the Federal Trade Commission has five Commissioners, I believe. At the moment not one of them is a scientist.

Mr. DURANT. They are not attracted toward it.

Dr. WYNDER. They are not attracted to it, either. If we have a Science Academy that puts out well qualified people with prestige, and if we increase the prestitge of our scientists in our governmental service, then we have a spot for them where they can well be used.

The point you made of having sciences attachés, they ought to be throughout the world and throughout many phases of our Government. I was very delighted with the aspect of the internationalism of this Academy, which I think is most important and most attractive.

I was delighted with your comments on the research atmosphere in the institute. After all, what we have to know in science is not what is known already but what is unknown. In other words, I cannot teach you something and then expect, just with what I teach you, that we are going to make scientific advance. We are going to make

scientific advance by your telling me something I, as a teacher, do not know already. This is an important aspect of the Academy.

Mr. DENNIS. There is one factor here I want to add. The biggest resource of research funds happens to be the U.S. Government, to my knowledge. There is also a law, I believe, that an individual cannot receive two sources of income from the U.S. Government unless the total of those two is something less than $2,500 per year.

Mr. BERESFORD. $10,000.

Mr. ANFUSO. In some cases it is not permitted regardless of amount because of conflict of interest.

Mr. DENNIS. In private institutions a professor has an opportunity not only to derive benefit from his salary but also to engage in Government research and to get paid for time he spends in Government research. In the staff you envision for this Science Academy, certainly they have to perform research in the Academy in order to attract the right people and have the right atmosphere. It has to be set up so that these people can be adequately rewarded financially without having to do research for private organizations in a Government facility in order to get a total income that they could derive from a private institution.

Mr. ANFUSO. So that they can live in this science center or city, as we call it.

Mr. DENNIS. Correct. They have to have a wage scale in there that they can live on independent of the research they conduct under them.

Dr. WYNDER. You must have a built-in incentive system. One of the troubles with civil service is it furthers mediocrity. It is like a cork on the ocean. You go up and down with trends rather than advance with your own initiative. Oftentimes when you take a problem and put it completely in Government hands as against putting it completely in the hands of industry, the people in industry solve the problem first because of their drive and incentive. It is important, if you keep these people in Government service, that you have a stimulus and incentive that keeps these people abreast with what they would have in industry.

Mr. DURANT. I agree with Dr. Wynder on this. In your closing remarks, Congressman Anfuso, you made the statement that scientists are humanitarians. It has been my experience and privilege to have worked closely with some scientific people whom I greatly admire and respect, and in conversations with them I find they do not have a narrow viewpoint but have an extremely broad viewpoint.

Mr. ANFUSO. That is right.

Mr. DURANT. Again not to overplay this international aspect, but if you provided the opportunity and the exciting research, the physical laboratories and time and proper environment, you would attract the best people in the country. Here again I feel there should be an opportunity on the professional staff of the Science Academy for foreign professors. They would be welcomed, I think, by our American scientists.

Mr. ANFUSO. I want to say in conclusion if we had a United Nations of scientists, we would never have a war. Thank you very much.

(Whereupon, the subcommitee adjourned.)

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